in a platinum crucible, the oxid of mercury was decomposed, and its elements expelled, and a small portion of a green oxid remained in the crucible. In several repetitions of the process this, invariably, occurred. I had been led to suspect that this was the oxid of nickel, because the alkaline solution, from which it had been obtained, gave a black precipitate, with the hidro-sulphuret of ammonia; accordingly, on fusing a portion of this oxid, with borax, under the blow-pipe, it produced a glass of a hyacinth red; the same fact took place with a portion of a substance, known to be the oxid of nickel, which was fused with borax, for the sake of comparison. On fusing a portion of the chromat of lead, or Siberian red lead ore, with borax, and afterwards with vitreous phosphoric acid, glasses of an emerald green colour were produced.

Hence it was concluded, that the meteoric stones of Weston do not contain *chrome*, but that the green oxid obtained, was the oxid of nickel.

No. LII.

Observations of the Comet which appeared in September 1807, *in the Island of Cuba, by J. J. de Ferrer.*

Read August 19th, 1808.

		Mean time at the City of Havanna. h ′ ″	The observed long. of the Comet. ° ′ ″	The observed lat. of the Comet. ° ′ ″
1807. Octr.	1	6 54 50	220 21 12	18 46 03 N.
	18	6 54 42	234 36 58	37 41 11
Novr.	3	6 56 05	251 41 25	51 13 00
	4	6 49 30	252 57 08	51 54 42
	7	6 44 20	257 02 22	53 54 18
	17	7 04 26	272 54 40	59 17 31
	18	6 27 36	274 37 42	59 42 37
	19	6 44 10	276 27 40	60 06 13
	25	6 59 07	287 53 57	61 56 32
Decr.	1	7 26 00	299 55 31	62 51 30

The longitudes and latitudes of the preceding table, have been deduced from angular distances observed of Arcturus, Vega, Altair, α, β and γ in the Swan, with the circle of reflection, described in page 265 of this volume.

The observations from the 1st Octr. till the 7th Novr. were made in the city of Havanna, the others at the plantation of

Don Joseph de Cotilla, situated in latitude 22° 55′ 16″ N. and 44″,3, in time, E. of Havanna.

The times of the observations were determined by a good chronometer, regulated by absolute and corresponding altitudes of the sun and stars, and the times observed at the plantation, are referred to the city of Havanna, by the difference of meridians.

To determine the place of the comet, many series of observations were made with two or three of the above named stars, choosing those that made the most convenient triangles, and as the different observations could not be made at the same time, care has been taken, to refer all the distances observed, to the same instant, by means of the variation observed of the distances of the said stars from the comet.

The distances observed were freed from the effects of refraction, corrected by reference to the state of the thermometer and barometer.

The places of the stars were taken from the *Connoisance dc temps*, of Paris, 1806; allowance being made for the proper motion, precession of the equinox, nutation and aberration. Further, the latitudes and longitudes of the said table are the apparent, that is, affected by the nutation and aberration. The elements of the orbit of the comet were calculated from the first observations which I made in Havanna, that is, from 1st Octr. to 7th Novr., by Don Francis Leamur, Lieutenant Col. of the Royal Corps of Engineers, and are the following:—

Passage through the perihelion, mean time at the city of Havanna, Septr. 18th	11^h 58′ 59″
Longitude of the ascending node.	8^s 26° 39′ 09″
Inclination of the orbit.	63 12 30
Place of the perihelion.	9 00 45 01
Perihelion distance, that of the sun being 1. . .	0,6462128

After having concluded the observations, namely up to the 1st December, I determined to calculate the elements of the parabolic orbit, by the combination of all the observations, and the following elements are the results.

Passage through the perihelion, mean time, at the city of Havanna, Septr. 18.	12^h 37′ 00″
at Greenwich, ...	18 06 40
Longitude of the ascending node from the mean equinox=	8^s 26° 42′ 12″
Inclination of the orbit.	63 12 51
Place of the perihelion.	9 00 51 35
Perihelion distance, that of the sun being 1	0,6462667.

Comparison of the observations with the results of the theory calculated by the above elements.

The longitudes and latitudes observed and calculated in the following table, are freed from nutation and aberration.

The two last columns shew the difference between the longitude and latitude, observed and calculated.

1807.	Mean time, Havanna.	The observed Longitude.	The observed Latitude.	Calculated Longitude.	Calculated Latitude.	Diff. long.	Diff. lat.
	h ′ ″	° ′ ″	° ′ ″	° ′ ″	° ′ ″	″	″
Octr. 1	6 54 50	220 21 14	18 46 32 N	220 21 37	18 46 30 N	—23	+02
18	6 54 42	234 37 06	37 41 36	234 36 19	37 42 15	+47	—39
Novr. 3	6 56 05	251 41 39	51 13 17	251 41 36	51 12 55	+ 3	+22
4	6 49 30	252 57 25	51 55 00	252 58 12	51 54 21	—49	+39
7	6 44 20	257 02 42	53 54 33	257 02 25	53 55 01	+17	—28
17	7 04 26	272 55 16	59 17 42	272 55 03	59 18 36	+13	—48
18	6 27 36	274 38 23	59 42 49	274 38 50	59 42 58	—27	—09
19	6 44 10	276 28 21	60 06 25	276 28 39	60 06 46	—18	—21
25	6 59 07	287 54 41	61 56 37	287 55 14	61 56 51	—33	—14
Decr. 1	7 26 00	299 56 18	62 51 30	299 56 44	62 51 22	—26	+08

Continuation of Astronomical Observations, made at the plantation of Don Joseph de Cotilla.

Determination of Latitude.

1807, Novr. 13	By 8 series of ⊙'s double altitudes, observed near the meridian, with a circle of reflection. . .	22° 55′ 14½″ N.		
17	ditto ⊙'s diameter.	22 55 15½		
21	ditto ditto. .	22 55 09½		
			mean.	22° 55′ 13″,5 N.
Novr. 17	By 4 series of double altitudes of the pole-star. . . .	22 55 20		
20	By 2 series of Fomalhat. .	22 55 17		
			mean.	22 55 18, 5
	Mean Latitude.			22 55 16

By astronomical observations, I have determined the bearing of the highest hill of Camoa, N. 13° 34′ 10″ W.

The hill of Camoa, from the city of Havanna, according to the survey which was made by the order of Government, was determined =29250. Varas of Castilla =13,11 geographical miles, bearing S. 45° E.

Latitude of Havanna, according to a great number of observations made with the same circular reflector.		23° 08′ 30″
Hill of Camoa S. 45 E. 13′,11 miles, difference of latitude .	=	9 16
Latitude of the hill of Camoa.		22 59 14
By direct observations on the hill, with the circular. . .		22 59 18
Mean latitude of the hill.		22 59 16

The combination of the two bearings, and the latitudes of the hill of Camoa and Havanna, gives the former E. of the city of Havanna 11′ 05″,2=44″,3 in time.

Observations made on a lunar eclipse, on the 14*th Novr.* 1807.

	h	′	″
The beginning of the eclipse, apparent time.	13	52	12
beginning of immersion of Tycho.	14	15	52
end of immersion of Tycho.	14	19	12
beginning of Mare humorum.	14	23	32
end of the eclipse.	15	58	42

Observation of apparent lunar distances, observed with the circle of reflection, at the plantation.—The distances in the following table are the result of 4 series of direct and inverse observations.

1807.		Appt. time. h ′ ″		Appt. Dist. ° ′ ″	Ther.	Barom.
Novr.	14	8 01 12	*a* ♉ ☾'s remote limb.	19 06 40	65½	30 10
		8 26 51	ditto. ditto.	18 57 52		
		15 37 40	*a* ♉ ☾'s nearest limb.	16 45 37		
	17	9 07 30	ditto. ditto.	20 51 04	66	30 00
		9 24 40	ditto. ditto.	21 00 46		
	19	20 31 20	☉ ☾ nearest limbs.	118 10 53	72	30 00
		21 17 28	ditto.	117 50 13		
	21	21 33 52	ditto.	92 16 37	75	29 96
	22	17 25 27	*a* ♍ ☾'s nearest limb.	41 43 54	67	30 10
	24	17 53 15	ditto. ditto.	12 37 06	65	30 15
		22 01 38	☉ ☾	51 56 57	72	30 10
		22 16 12	ditto.	51 51 26		
Decr.	2	22 57 34	ditto.	52 58 33	77	30 00
		23 23 09	ditto.	53 09 29½		
		23 57 20	ditto.	53 22 46		
	3	0 50 54	ditto.	58 42 14½		
	4	3 50 27	ditto.	66 14 57½	74	30 12
		4 11 51	ditto.	66 19 55		
	7	1 51 48	ditto.	99 05 41	74	30 10
		2 11 58	ditto.	99 12 32		
		6 14 33	☾'s and Atair nearest limb.	58 57 49	70	29 98
		6 26 30	ditto.	59 00 25		
	9	6 33 59	☾ *a* ♉ remote limb.	47 53 01	69	30 00
	15	7 04 51	☾ *a* ♉ remote limb.	29 03 30½	74	29 95
		7 16 24	ditto. ditto.	29 10 25		
	20	12 13 28	☾ and Regulus remote limb.	21 25 48	70	30 10
		12 18 16	ditto.	21 28 25		
1808.		12 31 02	ditto.	21 35 14		
Jan.	11	14 06 42	☾ *a* ♉ nearest limb.	26 13 05	68	30 15
		14 23 14	ditto.	26 18 48		
	19	16 08 31	☾ and Antares nearest limb.	37 44 55	55	30 14
		16 23 02	ditto.	37 39 58		
	21	21 25 35	☉ ☾	61 55 05	71	30 08
		21 45 24	ditto.	61 49 10		

January 11*th*, 1808. *Occultation of* ᵛ ♊ *by the moon.*

Immersion on the dark limb.	Apparent time.	14h 46′ 11″,4
	Mean time. . .	14 54 32, 0

The disappearance was instantaneous—magnifying power of the telescope, 75.

January 27. By four series of double altitudes of Canopus, near the meridian, observed with the circular reflector, corrected by the horary angles, and refraction, the meridian altitude was determined. . . . . . 14° 28′ 53,5″

By 4 series of similar observations on Sirius. 50 36 54,4

By 10 series of angular distances, observed with the circular reflector, and corrected for refraction, the mutual distance was determined =36° 17′ 19,4″.

The difference of right ascension in time, of the above stars =16′ 59,5″.

By the distance observed, and the difference of right ascension results the difference of declination. 36° 08′ 00,4″

The difference of meridional altitudes =difference of declinations. 36 08 00,9

Taking the latitude of the place as stated above 22° 55′ 16″ and correcting the meridional altitudes observed, from nutation, aberration, and precession, we have the true, or mean declinations of the two stars on 1st January 1808.

Canopus. . . .	52° 35′ 34,9″
Sirius.	16 27 36,8

Comparing the observations of la Caille on 1750, and supposing the annual precession in longitude=50,1″ we have the proper motion of Canopus in declination in 58 years—0′ 10,1″

Sirius. . . . +1 02,0

Mean declination of Sirius, according to the Rev. Nevill Maskelyne on the 1st of January, 1808.	16° 27′ 30″
Connoisance de temps.	16 27 38,6
By the observation with the circular reflector.	16 27 36,8

Astronomical observations made at the city of Havanna. Latitude of the place 23° 08′ 30″.

Occultations of stars by the moon, observed with an Achromatic telescope—magnifying power 75.

April 5th, 1808.	☾ 1 *a* ♋ on the dark limb, apparent time.		11h 53′ 34″
May 2d,	374 of Mayer on the dark limb.	ditto.	9 01 49
3d,	*w* Lion on the dark limb.	ditto.	10 33 49

The immersions were instantaneous.

Observations made on a lunar eclipse at the city of Havanna, on the 9th of May, 1808:—magnifying power of the telescope 70.

IMMERSIONS.	Mean time. h ′ ″	EMERSIONS.	Mean time. h ′ ″
Beginning of the Eclipse.	12 22 29	End of total darkness of the ☾	14 55 10
Beginning of Grimaldus.	12 27 18	End of Grimaldus.	15 01 50
End of ditto.	12 27 58		
Beginning of Aristarcus.	12 28 38		
End of ditto.	12 30 08	End of Aristarcus.	15 05 45
Beginning of Mare humorum.	12 37 57	Beginning of Tycho.	15 14 14
ditto. of Copernicus.	12 39 37	End of ditto.	15 15 47
End of ditto.	12 40 57	Center of Schikardus.	15 19 28
Beginning of Plato.	12 43 57		
End of do.	12 45 07	End of Plato.	15 21 23
Beginning of Mare serenitat.	12 50 57	Beginning of Mare serenitat.	15 28 29
Center of ditto.	12 55 16	Center of ditto.	15 33 07
Beginning of Tycho.	12 56 46	End of ditto.	15 37 57
End of ditto.	12 58 41	End of Taruntius.	15 44 17
Beginning of Mare Crisium.	13 09 21	Beginning of Mare crisium.	15 46 46
End of ditto.	13 14 20	End of ditto.	15 49 26
End of Langrenus.	13 18 00		
Total darkness of the ☾.	13 21 25	The end of the eclipse.	15 54 36

The above observations of the lunar eclipse are very exact, excepting the beginning and the end of the eclipse, which are liable to the error of one and a half minute, on account of the strong penumbra.

Table of the results of the occultations of the stars by the moon.

	Imm. ν ♊ ☾ at plantation Jan. 11, 1808.	Imm. 1 a ♋ ☾ Havanna. April 5, 1808.	Im. 347mayer Havanna. May 2, 1808.	Imm. w ♌ ☾ Havanna. May 3, 1808
	h ′ ″	h ′ ″	h ′ ″	h ′ ″
Mean time of immersions.	14 54 32	11 56 07	8 58 14	10 31 26
Longitude west from Paris.	5 38 06	5 38 50	5 38 50	5 38 50
Mean time at Paris.	20 32 38	17 34 57	14 37 04	16 10 06
Apparent longitude of the stars.	94°07 55	130°26 03,6	124 45 10,5	138 52 00
Apparent latitude of the stars.	3 04 48 S.	5 29 34 S.	5 20 48 S.	5 34 07 S.
Latitude——Vertical angle.	22 47 52	23 01 13		
Logarithmic radius of the earth.	9.9998036	9.9998000		
Equatorial horiz. parallax of the ☾	57 23,8	58 24,5	57 15	58 05,3
Parallax in Longitude.	—45 36,0	—41 35,9	—35 44,5	—38 52,3
Parallax in latitude.	+13 05,2	+29 17,9	+22 38,3	+31 16,2
Apparent difference of latitude between the moon and stars.	5 03	6 08,0	7 36,0	14 31
Conjunction mean time.	13h59 34			
Havanna west from the plantation.	44,3			
Conjunction in Havanna by observ.	13 58 49,7	11h09 37	8 18 11	9 34 32
At Paris by the new tables.	19 38 24,0	16 48 51	13 57 11	15 13 40
Havanna west from Paris.	5 39 34,3	5 39 14	5 39 00	5 39 08

Results of observed lunar distances.

	January 11th, 1808 ☾ α ♉	☾ α ♉	January 19th, 1808. ☾ & Antares.	☾ & Antares.
	h ′ ″	h ′ ″	h ′ ″	h ′ ″
Apparent time of the observations.	14 06 43	14 23 18	16 08 31	16 23 02
Apparent distances nearest limb.	26°13 05	26°18 48,2	37 44 45	37 39 55
Altitudes of ☾ calculated { Appt.	43 03 40	39 27 20	47 18 20	48 57 00
Altitudes of ☾ calculated { True.	43 49 31	40 10 30	47 57 34	49 35 01,5
Altitudes of the stars do. { Appt.	16 51 40	13 07 10	13 33 30	16 13 20
Altitudes of the stars do. { True.	16 48 41	13 03 20	13 29 41	16 10 09
Corrected distances. . .	27 12 22,8	27 21 06,4	38 37 06,1	38 29 02,8
Apparent longitude of the stars.	67 06 52,3		247 05 00,6	
Apparent latitude of ditto.	5 28 47S.		4 32 30S.	

True longitude of the moon by observations January 11th, 14h 15′ 00″,5 } Apparent time at the Plantation. . . . 3s 04° 21′ 02″,7

January 19th at 16h 15′ 46″,5 apparent time. . 6 28 30 03,5

		Havanna W. from Paris.
Longitude of the Plantation W. from Paris=5h 38′ 29″,7+44″,3	=	5h 39′ 14
Ditto from the observation of 19th . 5 38 18, 5+44, 3	. .	5 39 03

Solar eclipse of June 16th, 1806, in the city of Havanna.

Apparent time. h ′ ″		Dist. of the horns. ′ ″	
8 55 34,6	beginning of the eclipse	0 00,0	Observed by Don Antonio de Robredo, with a Heliometer of Dollond.
8 57 20,2	. . . .	6 12,9	
8 59 22,0	. . . .	8 51,6	
9 02 08,6	. . . .	11 40,0	
9 04 35,8	. . . .	13 31,5	
9 07 44,0	. . . .	15 17,0	
9 11 40,0	. . . .	17 19,3	

	Mean time. h ′ ″
With the elements of page 270 of this Volume, I have calculated the conjunction, by the beginning, June 15th.	22 50 58
By the first observation of distance	22 51 03
By the second.	22 51 07
By the third.	22 51 04
Conjunction June 15th, Astronomical time.	22 51 03
Ditto. in Paris, page 296, June 16th.	4 30 12
Havanna west from Paris.	5 39 09

By the Solar Eclipse (page 162,) observed in the city of Havanna, and at Lancaster in Pennsylvania. U. S.

Havanna west from Lancaster	0h 24′ 25″
Lancaster west from Paris (page 297.)	5 14 41
Havanna west from Paris.	5 39 06

Longitude of Havanna, by the observations compared with the new tables published at Paris in 1806.

		h ′ ″	
Occultations of stars.	January 11, 1808.	5 39 34	
	April 5.	5 39 14	
	May 2.	5 39 00	
	May 3.	5 39 08	
Distances of moon.	α ♉ January 11.	5 39 14	
	α ♍ January 19.	5 39 03	
Solar eclipse, 1803.		5 38 16	
do. 1806.		5 38 20	
Moon's eclipse, May 9, 1808.		5 38 51	
			5 38 55
By corresponding observations of solar eclipse February 21, 1803.		5 39 06	
Ditto June 16, 1806.		5 39 09	
			5 39 07
Havanna inferred from Philadelphia, by the chronometer, No. 63.		5 39 18	
Inferred from Veracruz, page 225.		5 38 37	
Ditto from Porto Rico, page 225.		5 38 34	
			5 38 50
Havanna west from Paris.			5 38 57

Passage of Venus over the disk of the Sun, June 3d, 1769.

Elements from Astronomical tables at	10h 11′ 47″ mean time at Paris.
Longitude of the sun, apparent equinox.	73° 27 18,3
Right ascension of the sun.	72 03 16
Horary motion in ☉'s right ascension.	2 34
Relative horary motion in longitude	3 57,40
Horary motion of Venus in latitude S.	0 35,42
Inclination of the orbit.	8 29 10,00
Apparent obliquity of the ecliptic	23 28 11,5
Radius vector of the earth.	1,0151990
Radius vector of Venus.	0,7262650
☉'s semidiameter.	15′ 47″,07

By a previous calculation of the observations of this passage, I had determined the following elements:—

Sun's parallax at the mean distance from the earth =	8″,62378
Apparent conjunction, mean time at Paris =	10h 11′ 47″
Apparent longitude of Venus.	73 27 18,3
Duration of the passage between the interior contacts =	5h 41′ 54″,5 in mean time.
or	5 41 52,1 in apparent time.
Latitude of Venus at conjunction, north.	10 15,94
The shortest distance of the centers.	10 09,18
Difference of the semidiameters of ☉ and ♀	15 15,89
Sum of the semidiameters.	16 13,27
Difference of Venus and sun's parallaxes at the passage =	21,352

TABLE I.

Reduction of the observations to the center of the earth.

		Appt. time of the observations.	Effect of Parallax	Appt. time of con. center of earth	Long. from Paris.	Contacts at center of earth. Appt. time at merid of Paris II.	III.	IV.
		h ′ ″	′ ″	h ′ ″	h ′ ″		h ′ ″	h ′ ″
Petersburg.	III	15 24 41	—5 16	15 19 25	—1 51 56		13 27 29	
	IV	15 43 27	—4 58	15 38 29				13 46 33
Cajaneburg.	II	9 20 45	+6 44	9 27 29	—1 41 47	7 45 48		
	IV	15 32 27	—4 36	15 27 51				13 46 10
Wardhus.	II	9 34 10	+6 27	9 40 37	—1 55 07	7 45 30		
	III	15 27 24	—4 33	15 22 51			13 27 44	
	IV	15 45 41	—4 09	15 41 32				13 46 25
Batavia.	III	20 30 13	—4 02	20 26 11	—6 58 15		13 27 56	
	IV	20 48 31	—3 45	20 44 46				13 46 31
Gurief.	III	16 52 25	—6 28	16 45 57	—3 18 24		13 27 33	
	IV	17 11 06	—6 06	17 05 00				13 46 36
Oremburg.	III	17 05 06	—6 12	16 58 24	—3 30 58		13 27 56	
	IV	17 23 24	—5 53	17 17 31				13 46 33
Orsk.	III	17 18 26	—6 09	17 12 17	—3 44 43		13 27 34	
	IV	17 36 57	—5 52	17 31 05				13 46 22
Pekin.	III	21 08 24	—4 27	21 03 57	—7 36 30		13 27 27	
	IV	21 26 54	—3 54	21 23 00				13 46 30
Mean results of the III and IV Contacts							13 27 39,9	16 46 27,5

In the calculation of this and the following tables, the parallax of the sun, at the mean distance of the earth $=8''62378$, and the difference of parallaxes at the passage $=21'',352$.

Note. The III contact at Petersburg was observed $13^h\ 28'\ 29''$ and I subtracted one minute of time, being probably an error committed in setting down the time of the clock.

TABLE II.

Reduction of the observation to the center of the earth.

		Apparent time of observations.	Effect of parallax.	Appt. time at the center of the earth.	Longitudes from Paris.	Appt. time of con. at center of the earth at Paris.
		h ′ ″	′ ″	h ′ ″	h ′ ″	h ′ ″
Paris.	II	7 38 45	+7 03,1			7 45 48,1
Greenwich.		7 29 25	+7 04,2	7 36 29,2	+00 09 21	7 45 50,2
Kew.		7 28 17	+7 04,2	7 35 21,2	+ 10 24	7 45 45,2
Oxford.		7 24 20	+7 02,0	7 31 22	+ 14 23	7 45 45
London. •		7 29 16	+7 04,0	7 36 20	+ 9 37	7 45 57
Stockholm.		8 41 46	+6 56,0	8 48 42	— 1 02 55	7 45 47
Upsal.		8 40 12	+6 57,4	8 47 09	— 1 01 15	7 45 54,4
Mean.			+7 01,6		Mean.	7 45 49,5

TABLE III.

		Apparent time observations. h ′ ″	Effect of parallax. ′ ″	Appt. time at the center of the earth h ′ ″
Fort Prince of Wales	II	1 15 23	+4 12,1	1 19 35,1
	III	7 00 47	+0 39,1	7 01 26,1
	IV	7 19 20	+0 49,5	7 20 09,5
St. Joseph.	II	0 17 27	+0 20,3	0 17 47,3
	III	5 54 50	+4 47,9	5 59 37,9
	IV	6 13 19	+4 46,0	6 18 05,0
Taity.	II	21 44 04	−5 33,4	21 38 30,6
	III	3 14 08	+6 17,4	3 20 25,4
Philadelphia.	I	2 13 45	+3 38	2 17 23
	II	2 31 28	+3 54	2 35 22
Cape Francais.	I	2 26 12	+2 23,6	2 28 35,6
	II	2 44 44,5	+2 37,6	2 47 22,1
Cambridge	II	2 47 30,0	+4 19,0	2 51 49,0

TABLE IV.

Difference of time between the interior and exterior contacts at the center of the earth.

	′ ″	
Petersburg	19 04	Egress.
Wardhus.	18 41	
Batavia.	18 35	
Oremburg	18 37	
Gurief.	19 03	
Orsk.	18 48	
Pekin.	19 03	
Fort Prince of Wales.	18 42	
St. Joseph.	18 27	
Greenwich.	18 48	Ingress.
Cape Francais.	18 47	
Oxford.	18 41	
Mean.	18 46,4	

		h ′ ″	effect of parallax.
IV contact at Paris, center of the earth, Table I.		13 46 27,5	
Mean result of Table IV.		−18 46,4	
III contact by the observations of IV contact.		13 27 41,1	−4 54,1
By the mean of direct observations, Table I.		13 27 39,9	−5 18,1
Mean result for the III contact.		13 27 40,5	−5 06,1
II contact by Table II.		7 45 49,5	+7 01,6
Total duration of the interior contacts (n)		5 41 51,0	−12 07,7
By the observations of Wardhus.	5h 42′ 14″,0	5 41 54,8	−11 10,0
By ditto Cajaneburg.	5 41 35 5		
Mean. (a)		5 41 52,9	−11 38,8
By the observations at Taity.		5 41 54,8	+11 50,8
By the observations at St. Joseph.		5 41 50,6	+ 4 27,6
By ditto . F. P. Wales.		5 41 51,0	− 3 33,0

Results of sun's parallax at the mean distance of the earth.

By the duration, at Taity and (n)		8″,600
Taity and (*a*)		8,620
Taity and Wardhus.	8″,731	8,623
Taity and Cajaneburg.	8,516	
St. Joseph and F. P. Wales.		8,623
St. Joseph and (*a*) =	8,645	8,616
Taity and F. P. Wales. =	8,588	
Mean result.		8,615

Contacts at the center of the earth, for the meridian of Paris; allowing the sun's parallax at the mean distance of the earth=8″,615.

	h ′ ″	
I Contact. Apparent time.	7 27 02,5	
II	7 45 48,9	
III	13 27 41,4	
IV	13 46 27,8	
Error of the duration of the observations at Wardhus.		+22″,8
Cajaneburg.		—16,0
(n)		— 0,5
Taity.		+ 1,3
St. Joseph.		— 2,3
F. P. Wales.		— 1,7

Determination of the longitude of different places, from Paris, by the observation of the passage of Venus.

			h ′ ″	h ′ ″
Philadelphia, by the	I	exterior contact.	5 09 40,0	= 5 10 03,7 W.
	II	interior contact.	5 10 27,5	
Cape Francais.	I		4 58 27,5	4 58 27,5 W.
	II		4 58 27,4	
Cambridge, N. Eng.	II			4 54 00,5 W.
Taity.	II		10 07 17,9	10 07 17,2 W.
	III		10 07 16,6	
St. Joseph.	II		7 28 01,6	7 28 02,8 W.
	III		7 28 03,9	
F. P. Wales.	II		6 26 13,5	6 26 14,4 W.
	III		6 23 15,3	
Wardhus.	II		1 54 47,6	1 55 01,5 E.
	III		1 55 09,9	
	IV		1 55 07,1	
Cajaneburg.	II		1 41 39,6	1 41 31,5 E.
	IV		1 41 23,6	
Gurief.	III		3 18 15	3 18 23,5 E.
	IV		3 18 32	
Oremburg.	III		3 30 42	3 30 52,5 E.
	IV		3 31 03	
Orsk.	III		3 44 35	3 44 36,0 E.
	IV		3 44 37	
Batavia.	III		6 58 30	6 58 24,0 E.
	IV		6 58 18	
Pekin.	III		7 36 16	7 36 24,5 E.
	IV		7 36 33	
Petersburg.	III		1 51 44	1 51 52,5 E.
	IV		1 52 01	

Passage of Mercury over the disk of the Sun, Novr. 12th, 1782.

		h ′ ″	
Philadelphia.	I contact	9 34 50	Mean time.
	II . .	9 40 00	
	III . . .	10 51 30	
	IV . .	10 57 35	
Paris. . .	I . .	2 58 04,5	Apparent time.
	II . .	2 04 30	
	III	4 17 40	
Greenwich. .	II . .	2 54 42	Apparent time.
Cambridge in New England.	II . . .	10 12 10	Apparent time.
	III . .	11 23 06	
	IV . .	11 29 14	

Difference of ⊙ and ☿'s semidiameters. . . 16′ 04″,27
Difference of horizontal parallaxes. . . . 4, 01
Horary relative motion in longitude. . . . 3 53, 45
Horary motion of ☿ in latitude, N. . . . 51 91

Appt. conjunction at Paris, by the observ. at Paris and Greenwich =	4h	04′	09″
Apparent conjunction, by observations at Philadelphia. . .	22	53	59
Apparent conjunction Cambridge. . .	23	10	16

Longitude of Philadelphia west from Paris. . 5h 10′ 10″
Cambridge west from Paris . . 4 53 53

Passage of Mercury over the disk of the sun, Novr. 5th, 1787.

Observations.

			Apparent time h ′ ″
Paris, interior contact at the ingress.			1 19 00
Viviers.		do.	1 28 32
Cadiz.		do.	0 44 30
Marseilles.		do.	1 31 07
Montauban.		do.	1 15 14
Vienna.		do.	2 15 08
Prague.		do.	2 07 26
Philadelphia.	I		20 08 00
	II		20 09 30
	III		00 59 34
	IV		1 01 14
Cambridge in N. England.	I		20 24 04
	II		20 25 52
	III		1 15 44
	IV		1 17 36
Montevideo	III		2 15 11
	IV		2 16 54

Difference of the horizontal parallaxes. . . . . =	4″,149
Horary relative motion in longitude between the ingress and conj.	349,55
Between the egress and conjunction.	350,00
Horary motion in latitude, N.	51,40
½ diameter of ⊙—1″,50 irradiation.	969,28

	h ′ ″
Apparent conjunction at Paris, by the observations in Europe =	3 33 16
Philadelphia.	22 23 22
Cambridge	22 39 36
Montevideo.	23 39 01
Longitude of Philadelphia west from Paris.	5 09 54
Cambridge west from Paris.	4 53 40
Montevideo west from Paris.	3 54 15

Annular eclipse, April 3d, 1791.

Elements from the Astronomical tables published at Paris, in the year 1806, *by order of the Commissioners of longitude.*

	h ′ ″
1791. April 3. Astronomical mean time at Paris.	0 54 40
☉'s longitude from the apparent equinox.	13°41 58
☉'s right ascension in time.	0h 50 25
☉'s semidiameter.	0°16 00,42
Equation of time.	+ 3 17,53
☉'s horary motion in longitude.	2 27,59
Horary motion in ☉'s right ascension in time	9,10
Horary diminution of the equation of time.	0,90
☾'s longitude from the apparent equinox.	13°41 37,8
☾s north polar distance.	89 15 05,9
☾'s equatorial horizontal parallax.	54 36,1
☉'s equatorial horizontal parallax.	8,6
Apparent obliquity of the ecliptic.	23 27 53,0
Moon's horary motion in longitude.	30 12,97
Moon's horary motion in latitude S.	2 46,72
Horary diminution of ☾'s horizontal parallax.	00,75
Equation of 2d order of the ☾'s horary motion in longitude.	— 00,40
ditto ditto ditto in latitude.	+ 00,11
Proportion of the equatorial horiz. paral. and the ☾'s horiz. diameter.	60 : 32 45,1
Proportion of the equatorial and polar diameters of the earth = 330 : 329	

Observations made by the Rev. Nevil Maskelyne, at Greenwich.

0h 18′ 40″	Apparent time, beginning of the eclipse.
1 44 51	Least distance of the limbs. 12′ 52″
3 06 47	End of the eclipse.

By the mean result of 8 observations, ☉'s diameter was . 31′ 57″,0

	h ′ ″	h ′ ″	h ′ ″
Apparent time of the observations at Greenwich.	0 18 40	1 44 51	3 06 47
Difference of ☾ and ☉ equatorial parallaxes.	0 54 27,8	54 26,7	54 25,8
Parallax in longitude.	—18 02,4	—29 07,0	—38 05,0
Parallax in latitude.	—34 47,1	—30 18,6	—27 10,4
☾'s apparent semidiameter—2″ inflexion.	15 02,2	15 01,0	14 59,0
☉'s semidiameter—2″ irradiation.	15 58,4	15 58,4	15 58,4

Conjunction at Greenwich by the combination of the beginning and the end of the eclipse. . . apparent time. . . . 0h 45′ 16″,5

Correction of latitude by the tables. . . . + 13

By the least distance of the limbs. . . . + 13,6

Supposing the irradiation of the sun's semidiameter = 1″,8

The ☉'s diameter was observed . . . 31′ 57″,0

By the tables. . . . 32 00, 8

$$\text{The corrected distance of the limbs} = \frac{32'\ 00'',8 \times 12'\ 52''}{31,57} = 12'\ 53'',5$$

The double irradiation. . . . — 3, 6

True distance of the limbs. . . . 12 49, 9

And the correction of moon's latitude corrected from the effect of refraction =+11″,5

Conjunction at Paris =(0h 45′ 16″,5+9′ 21″) =00h 54′ 37″,5

Observations at the National Observatory of Paris.

Beginning of the eclipse, apparent time. . . . =0h 36′ 55″,4

End of the eclipse. . . . 3 20 52 0

Conj. at Paris by the combination of the beginning and end of the eclipse.		0h 54′ 38″.5
Correction of the ☾'s latitude by the new tables	=+	00 09
Palermo, beginning, apparent time.	=	2 10 17, 0
Palermo, end.		3 59 20, 4
Conjunction at Palermo.	=	1 18 45
Conjunction at Paris = 1h 38′ 45″,5——44′ 06″	=	0 54 39, 5
Correction of ☾'s latitude	=+	11, 0
Petersburg apparent time, beginning of the eclipse.		2 56 30
Petersburg end of the eclipse.		5 21 26
By the combination of the beginning and end, conjunction in mean time	=	2 46 37, 6
Conjunction at Paris, mean time = (2h 46′ 37″,6——1h 51′ 56″)	=	0 54 41, 6
Correction of the ☾'s latitude by the tables.	=+	10, 0

			h ′ ″		″
By the observations of Greenwich, conj. at Paris			=0 54 37,5	correction of ☾'s lat.	=+11,5
By	ditto	Paris.	0 54 38,5	. . . . .	+ 9,0
By	ditto	Palermo.	0 54 39,5	. . . . .	+11
By	ditto	Petersburg.	0 54 41,0	. . . . .	+10
Conjunction at Paris, mean time.			0 54 39	. . . . .	+10,3
Correction of ☾'s longitude by the new tables.				. . . . .	=+20,3

Observations at Cambridge, New England.

	h ′ ″	
April 2	18 01 27	Apparent time, beginning of the eclipse
	19 08 07	Annular formation.
	19 12 56	Annular break.
	20 28 26	End of the eclipse.

		h ′ ″	h ′ ″	h ′ ″
Apparent time of observation. . .		19 08 07	19 12 56	20 28 26
Moon's latitude by tables +10″,3	N.	47 21,7	47 08,4	43 38,7
☾'s equatorial horizontal parallax.		54 28,1	54 28,1	54 27,2
Parallax in longitude.		21 46,4	21 34,6	16 36,1
Parallax in latitude.		47 28,6	47 18,3	43 52,6
Apparent latitude of the ☾	S.	00 06,9	00 09,9	00 13,9
Horizontal ½ diameters of the ☾ . .		14 54,32	14 54,32	14 54,23
Augmentation of the ☾'s ½ diameter.		4,00	4,27	7,22
☾'s apparent semidiameters. . .		14 58,32	14 58,59	15 01,45
☉'s semidiameter from the tables.		16 00,42	16 00,42	16 00,42
Difference and sum of semidiameters		1 02,10	1 01,83	31 01,87

Horary relative motion in longitude between the formation of the annular and the time of the conjunction.	27′ 45″,8
Between the end of the eclipse and the conjunction.	27 45,2
Results : difference of semidiameter between the formation and the breaking of the annular, by observation.	61,45
By the Tables. $\frac{1' 02'',10 + 1' 01'',83}{2}$	61,96
Correction of the difference of semidiameters by the tables.	—00,51
Correction of the sum of semidiameters.	— 4,40

	h ′ ″
Conjunction from the annular formation, mean time .	20 00 40,8
annular breaking. . . .	20 00 40,8
end of the eclipse.	20 00 40,8

Longitude west from Paris . . . . . =4h 53′ 58″,2

Observation in the City of Philadelphia.

	h ′ ″		
Formation of annulus.	18 46 11,5	Apparent time	Observed by Mr. Rittenhouse
Break of annulus. . .	18 50 28,5	. .	
End of the eclipse. .	20 03 42	. .	

	h ′ ″	h ′ ″	h ′ ″
Apparent time of the observation. .	18 46 11,5	18 50 28,5	20 03 42
☾'s latitude by the tables +10″,3 N.	00 47 37,5	00 47 25,5	44 01,9
Parallax in latitude. . . . . . —	47 07,1	46 59,3	43 58,5
Apparent latitude of the ☾ . N .	00 30,4	00 26,2	00 03,4
Parallax in longitude.	24 35,3	24 28,3	20 35,4
☾'s apparent semidiameter. . .	14 57,35	14 57,56	15 00,74
Semidiameter of the sun. . . .	16 00,42	16 00,42	16 00,42
Diff. and sum of ☾ and ☉'s semidiameters.	1 03,07	1 02,86	31 01,16

With the corrections—0″,5 for the difference of semidiameters and—4″,4 for the sum of semidiameters, according to the results of the observations at Cambridge, we have the following results :—

Conj. by the formation of the annulus. Mean time.	19h 44′ 37″	19h 44′ 37″,6
By the breaking of the annulus	19 44 38	
By the end of the eclipse.	19 44 38	
Longitude of Philadelphia west from Paris. . .	=	5 10 01, 4

Observations at George Town, Maryland.

	h ′ ″		
Formation of annulus.	18 36 43	Apparent time	Observed by Andrew Ellicott. Esq.
Break of annulus. .	18 39 57	. .	
By the end of the eclipse.	19 52 21	. .	

	h ′ ″	
Conjunct. by the formation of annulus, mean time.	19 37 00	19h 36′ 58″,5
By the breaking of ditto. . .	19 37 00	
By the end of the eclipse. .	19 36 53	
Longitude of George Town west from Paris . . . . . =		5 17 40, 5

Note. I have subtracted 1′ of time from the formation and the breaking of the annulus, from the observations at Philadelphia, and added 1′ of time to the formation of the annulus at George Town, those errors having been discovered by the result of the observations.

By the combination of the observations of the annular eclipse of the sun, April 3, 1791, I have determined the corrections of the

		Irradiation of the ☉'s semidiameter	inflex. of ☾'s semidiameter
		—1″,70	—2″,00
Page 298 of this Volume.	1806. Total eclipse of the ☉	— 1, 87	—1, 93
	1764. Annular eclipse of the ☉	— 2, 15	—1, 35
	1801. Occultation of α ♍ ☉		—1, 82
	1799. Passage of ☿ over the ☉	—1, 50	
Mean correction of the irradiation . .		—1, 80	. inflexion. . . —1, 75

Recapitulation of the results of longitudes of Philadelphia and Cambridge W. from Paris.

	Philadelphia. h ′ ″	Cambridge. h ′ ″
1769. Passage of Venus. , .	5 10 03,7	4 54 00,5
1782. Passage of Mercury. . .	5 10 10	4 53 53,0
1789. Passage of Mercury. . .	5 09 54	4 53 40
1791. ☉'s annular eclipse. . .	5 10 01,4	4 53 58,5
1806. Solar eclipse, page 297. .	5 09 57,0	
Mean results. . .	5 10 01,2	4 53 53